

Laparoscopic Management of a Retroperitoneal Duodenal Perforation Following ERCP for Periapillary Cancer

Chinnusamy Palanivelu, MCh, FRCS, Priyadarshan Anand Jategaonkar, MS, DNB, MRCS,
Muthukumaran Rangarajan, MS, DipMIS, Natesan Vijay Anand, MS,
Palaniswamy Senthilnathan, MS, DNB, MRCS

ABSTRACT

Introduction: Endoscopic retrograde cholangiopancreatography (ERCP) is a fairly common procedure being performed in several centers worldwide. Although it is proven to be efficient and relatively safe, complications do occur (1.8%). We present a patient with ERCP-induced retroperitoneal perforation of the duodenum treated laparoscopically at our institution.

Case Report: The patient is a 60-year-old female who underwent ERCP for obstructive jaundice due to periapillary carcinoma, during which the perforation occurred. Laparoscopy was performed 5 hours later and the perforation sutured primarily.

Results: The operating time was 125 minutes. On the fourth postoperative day, the patient developed a retroperitoneal collection, confirmed by computed tomographic scan. Re-look laparoscopy was performed and the fluid drained. She recovered completely and was discharged on the eighth postoperative day.

Conclusion: Duodenal perforation following ERCP is rare, with an incidence of 1.8%. Both surgical and non-surgical management have been reported, each with its specific indications. Our patient needed surgery, because the perforation was large and a retroperitoneal collection was present. Laparotomy is the preferred approach, though now laparoscopy is a viable and effective alternative, because it provides the benefits of minimal access, such as reduced pain and early ambulation.

Key Words: ERCP, Retroperitoneal duodenal perforation, Laparoscopy.

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is one of the most complex but still most common endoscopic procedures for tackling the majority of pancreatico-biliary problems. However, it carries a certain mortality and morbidity.^{1,2} Though less common, duodenal perforation during ERCP occurs in 1.8% of patients, and it carries significant mortality especially if not diagnosed early.³ Early recognition and prompt treatment form the cornerstone of the management protocol of this dreaded complication.⁴ We present such a case of retroperitoneal duodenal perforation, which was successfully managed by laparoscopic repair. To our knowledge, this is the first case of its kind to be reported.

CASE REPORT

The patient was a 60-year-old lady with acute abdominal pain referred to our hospital. She underwent ERCP for obstructive jaundice due to a periapillary tumor, with a plan to biopsy the tumor and stent the common bile duct. During the procedure, the (distal) second part of the duodenum was perforated, confirmed by visualizing the abdominal cavity with the scope passed through the perforation. The patient was then referred to our institution within 5 hours for further management. She was admitted with signs of acute abdomen. Intravenous fluids were administered, and a nasogastric tube was inserted. Intravenous antibiotics were administered (magnamycin-4gm/day + ornidazole-1g/day). Blood and urine investigations were performed, which showed leukocytosis, hyperbilirubinemia, and altered liver enzymes. A plain abdominal x-ray and ultrasonogram (USG) were normal, while a CT scan showed air and fluid in the retroperitoneum in the paraduodenal space. Surgical intervention (diagnostic laparoscopy) was planned. The patient was positioned supine on the operating table, with the operating and camera surgeon standing on the right side, the monitor placed on the left side. Four 5-mm and one 10-mm laparoscopic ports were placed in the upper abdomen. The left lobe of the liver was retracted anteriorly with a 5-mm flexible retractor. Air was entrapped inside the omentum and retroperitoneum over the hepatic flexure, right kidney, and duodenal area (**Figure 1**). This air was let out by opening the plane between the layers of omentum. No bilious fluid was present in the peritoneal cavity, so the retroperitoneum was approached by dividing the duodenum and was Kocherized

GEM Hospital & Postgraduate Institute, Coimbatore, India (all authors).

Address reprint requests to: M. Rangarajan, GEM Hospital & Postgraduate Institute, 45-A, Pankaja Mill Road, Coimbatore – 641045, INDIA. Telephone: 0091 422 2324105, Fax: 0091-422-2320879, E-mail: rangy68@gmail.com

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Figure 1. On laparoscopy, air trapped within the omentum and retroperitoneum.

with scissors. A localized collection of bilious fluid was adjacent to the second part of the duodenum (**Figure 2**). This fluid was sucked out, revealing a large 2x2-cm perforation with prolapsing mucosa identified on the lateral surface of the distal second part of the duodenum (**Figure 3**). Because the edges were not friable, we decided to perform primary closure with intracorporeal sutures. This was achieved in 2 layers, by first taking continuous sutures using 3.0 Vicryl, and then a layer of interrupted seromuscular sutures using 3.0 Ethibond Excel (**Figure 4**). Thorough peritoneal toilet was performed using the irrigation-suction device. Two drain



Figure 2. Retroperitoneal biloma adjacent to the distal second part of the duodenum.



Figure 3. Perforation clearly visualized over the lateral surface of the second part of duodenum.

tubes (size 24F) were placed, one in the vicinity of the second part of the duodenum and the other in the peritoneal cavity. All the port sites were closed.

RESULTS

The total operating time was 125 minutes. Orally, nothing was allowed, and total parenteral nutrition was commenced. The nasogastric tube was kept in situ for 3 postoperative days (POD), during which periodical suction was given. The patient continued to have fever ($\sim 100^{\circ}$ F), abdominal dis-



Figure 4. Suturing commenced with 3.0 Vicryl.

tension, and occasional pain during the first 3 postoperative days. Antibiotics were changed to intravenous piperacillin + tazobactam -13 g/day. The drain tubes drained 10 mL to 15 mL of fluid daily. In spite of the antibiotic change, the patient continued to have fever, so a CT scan was performed on the fourth postoperative day, which revealed retroperitoneal fluid collection extending from the right pararenal space to the right paracolic gutter, with no evidence of leakage from the perforated site (**Figure 5**). The previously placed drain tubes were visualized and found to be just anterior to this collection. A re-look laparoscopy was performed, and the collection (75 mL) was drained, with repositioning of the drain tubes. The patient continued to have low-grade fever for the next 24 hours, which resolved thereafter. Liquids were allowed orally on the second day following the re-look procedure, and a soft diet from the fourth day onward. Another CT scan done on the seventh postoperative day was normal. We do not routinely perform postoperative endoscopy in patients with duodenal perforations. The patient was discharged on the eighth postoperative day, and was followed up for 30 days. No problems occurred.

DISCUSSION

The incidence of duodenal perforation following ERCP is 1.8%.⁵ In a large series of ERCP procedures, Loperfido et al⁶ reported a 0.43% (12/2769) incidence of retroperitoneal perforations; 0.21% (6/2769) were treated conservatively, with 0.03% (1/2769) mortality. Other leading centers report that therapeutic endoscopy increases the risk of complications, and perforation is more likely when the examination is performed by an inexperienced endoscopist.⁷ CT scan is the

most useful investigation in post-ERCP duodenal perforations.⁸ As far as we know, the laparoscopic closure of duodenal perforations following ERCP has not been reported thus far. Of course, laparoscopic closure of perforated peptic duodenal ulcers has been widely reported, including our own study.⁹ At our institution, we have never performed open or laparoscopic repairs for post-ERCP injuries, this being our first. Not only can the suturing be performed laparoscopically, but a thorough peritoneal wash can also be given aided by the superior magnified image provided by the laparoscope. Laparoscopic pyloric exclusion after ERCP-induced perforation has been reported.¹⁰ The grading of duodenal perforations (**Table 1**) is important to the surgeon, as it quite accurately dictates whether a patient needs surgical or conservative management.¹¹ Usually, Type I perforations require immediate operative intervention, because they are larger in size and hence a greater risk of contamination is present. The other 3 types can be managed nonoperatively with close surveillance.¹² Surgical intervention should be undertaken if the patient does not improve or continues to deteriorate within 24 hours of treatment. Our patient had a 2x2-cm Type IV injury with significant soiling due to a retroperitoneal collection of bile, warranting operative intervention. Owing to its anatomical locality, there is a high likelihood that type IV perforations are referred to the surgeon quite late compared with intraperitoneal perforations.¹³ This late presentation leads to local sepsis in and around the region of perforation, which, in turn, is responsible for the friability and edema of the edges of perforation, thus adding significantly to the mortality and morbidity. Because our patient was referred to us within 5 hours of the perforation,

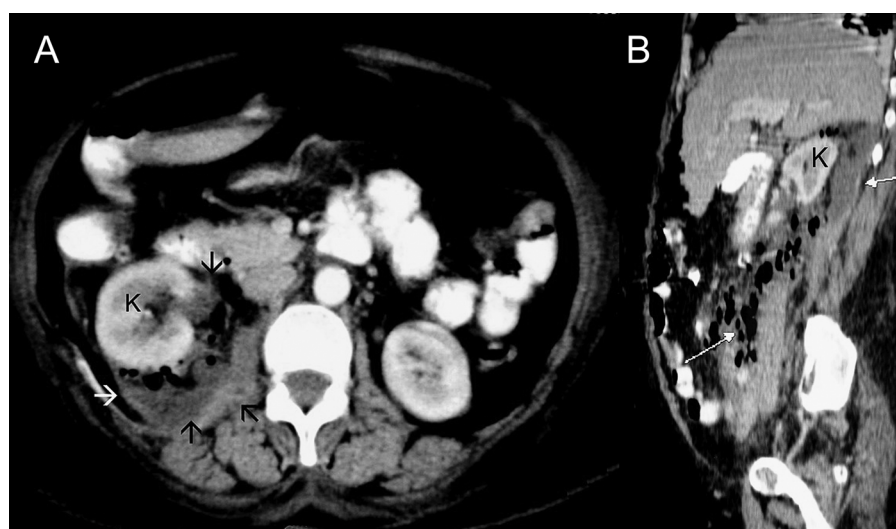


Figure 5. Postoperative computed tomographic scan (A = axial section, B = sagittal section): arrows showing a retroperitoneal collection of fluid and air displacing the right kidney (K).

Table 1.
Types of Duodenal Perforation

Types	Location
Type I	medial or lateral
Type II	peri-Vaterian
Type III	distal bile duct injuries
Type IV	retroperitoneal

the edges were not friable, so there was no problem in suturing the duodenum. In the case of a delayed presentation, chance of infection and tissue friability is high, rendering primary closure risky. Placing an omental plug is an option we often use to repair large perforations, but since in this case the perforation was retroperitoneal, the omentum could not be used. Patients with perforations diagnosed within 24 hours of surgery have a mortality rate of 13%, whereas diagnosis delayed beyond 24 hours increases mortality rates to 43% because of sepsis or multiorgan failure.¹⁴ Recently, there have been reports of using fibrin glue and hemoclips endoscopically to close these perforations.¹⁵ Larger perforations, irrespective of their site, warrant operative intervention, ie, an exploratory laparotomy or laparoscopy, subject to the availability of expertise. While dealing with retroperitoneal perforations (either third or fourth part of the duodenum), wide Kocherization with mobilization of hepatic flexure is desirable, followed by horizontal tensionless double-layered closure of perforation with inner absorbable and outer nonabsorbable suture material without compromising the lumen of the duodenum.¹⁶ It was unfortunate that our patient required a second surgery, but because it was performed laparoscopically as well, a laparotomy was avoided. It may be argued that the perforation could be managed by a single laparotomy, though minor leakage from the sutured area is a known complication following laparotomy as well.

CONCLUSION

Laparoscopic closure of post-ERCP duodenal perforations is an excellent alternative to traditional exploratory laparotomies. Laparoscopy provides a very good magnified view of the target tissues allowing adequate repair and thorough peritoneal toilet. Also, it gives the patient the added advantage of less pain and early recovery.

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